

AMATEUR SATELLITE REPORT

AMSAT's® Newsletter for the Amateur Radio Space Program



Amateur Satellite Report is endorsed by the
American Radio Relay League as the special interest
Newsletter serving the Amateur Radio Satellite Community

Number 145
March 25, 1987

Editor: Vern Riportella, WA2LQQ

Contr. Editors:

Eric Rosenberg, WA6YBT

Pete Killingsworth, KD7WZ

Paul Roemer, KG6LC

Managing Editor: Bob Myers, W1XT

Copyright 1987 by AMSAT®, The Radio Amateur Satellite
Corporation. AMSAT® is a registered trademark.

Digital QSOs Commence On Fuji OSCAR 12

JAMSAT's JR1FIG reported on Monday, February 23, FO-12 would undergo extensive Mode JD testing throughout the week. This has in fact occurred. As a result, several stations have reported successful Mode JD digital QSOs on FO-12.

First reports received by AMSAT NA indicated Peter Guelzow, DB2OS, in Hannover, West Germany, successfully copied FO-12 JD telemetry and then connected to himself at about 15:49 UTC on February 24. Peter repeated the experiment on the next FO-12 orbit at 19:35 UTC. Two days later at 23:37 UTC on February 26, WA5ZIB and KA9LNV reported engaging in what may have been the first U.S. Mode JD QSO.

According to JAMSAT, JARL had planned to have Mode JD on exclusively the week on February 23 for these Mode JD tests. No Mode JA activity was planned and it appears none has occurred. Because of an apparent Mode JD power short-fall, Mode JD operations are being carefully throttled. The cycle was described as follows: A ten minute on-off cycle embedded in a 4-hour on-off cycle embedded in a 2-day on-off cycle. In other words, JD was on every other 5 minutes, of every other 2 hours of every other day. This schedule was expected to run until the end of February or until potential users figure out what it means, whichever occurs sooner! No projections beyond that were made, however.

WA5ZIB and KA9LNV were using the G3RUH FO-12 modems available from Radiokit, P.O. Box 973, Pelham, NH 03076 (603-635-2235). These modems were the subject of the lead article in *Ham Radio* magazine in its February, 1987 edition. According to the new Radiokit owner, Carl Huether, KM1H, the basic kit sells for \$99.00 plus \$4 shipping (UPS) or \$5 by mail. Overseas shipping slightly higher. A Ten-Tec cabinet is available for \$12, Carl says. The bare PCB with instructions costs \$24.99. Master Charge and Visa accepted. Send a SASE to Radiokit for quotes and other info.

ASR has learned unofficially there is a trace registration problem with the PC artwork reproduced in the HR magazine article but this could not be confirmed by

presstime. If you work from the magazine artwork, it might be well to check with HR magazine or Radiokit to verify this information prior to proceeding.

The Tucson Area Packet Radio organization had previously announced its intent to produce its version of an FO-12-compatible modem beginning in March. (See ASR #135, 137, 138, 141 and 144.).

See related stories and sample traffic in this issue.

AMSAT OSCAR 10 Placed "Off Duty" For Two Months

AO-10 is now in a period of rapidly decreasing solar power due to seasonal changes in the angle between the spacecraft's solar panels and the sun. Consequently, the satellite has been withdrawn from all use until May 1st. AMSAT leaders around the world are emphasizing the urgent need for all stations to comply with a call for total non-use of the satellite during this period.

Since the Integrated Housekeeping Unit (IHU) on AO-10 is no longer functioning, there is no way to change the spacecraft attitude to adjust for seasonal changes in the sun-earth-satellite geometry. The result is a dramatic cut-back in the amount of power available to the satellite. Sun angles will reach precipitously low levels in late March. More significantly, however, during the entire two-month period of March through April, illumination levels will be dangerously low averaging less than 30% of optimum values. A table by G3RUH showing the situation appears in ASR #143.

If there is total cooperation with the call for non-use of AO-10, it may be available for use again beginning in May and continuing throughout the summer months. On the other hand, in the absence of total cooperation in not using AO-10 during the two month QRT period, chances of regaining AO-10 use later will be significantly reduced. Please help pass the word. Given complete cooperation, AO-10 will again be released for operation May through August.



FO-12 Traffic Sample

The following is sample FO-12 Mode JD traffic from late February collected and forwarded to ASR by DB2OS.

(26 Feb 87)

fm 8J1JAS to BEACON cti UI pid F0
JAS-1 RA 87/02/26 20:00:06
263 557 730 735 794 879 892 864 003 379
646 002 614 631 618 617 616 617 688 001
698 699 703 697 835 676 926 492 000 000
010 111 100 000 100 000 001 100 001 000

fm DB2OS to CQ DX cti UI pid F0

fm ON6UG to TEST via PA3EFU cti UI pid F0

fm DB2OS to ON6UG cti SABM +
fm ON6UG to DB2OS cti UA

fm DB2OS to ON6UG cti I00 pid F0
hello dr om, this is peter from hannover

fm ON6UG to DB2OS cti I10 pid F0
hello

fm ON6UG to DB2OS cti I11 pid F0
name freddy

fm ON6UG to DB2OS cti I12 pid F0
in Ghent

fm ON6UG to DB2OS cti I13 pid F0
good copy

fm DB2OS to ON6UG cti I41 pid F0
nice freddy 100% copy

fm DB2OS to ON6UG cti I42 pid F0
no problem

fm DB2OS to ON6UG cti I43 pid F0
you are the 2nd station on fuji!!!

fm ON6UG to DB2OS cti I44 pid F0
73's

fm ON6UG to DB2OS cti I45 pid F0
bye

(Further TLM-Frames are completely omitted to save space.)

(Ohhhh, a new station!!!)

(Let's try to connect him)
(He has received my SABM)
(First ON-DL on FUJI !!!)
(1st Information Frame)

(1st message from ON6UG)

(2nd info-frame from him)

(3rd info-frame from him)
(Control-Frames and retries now omitted..)

(next 5 minute period)

fm 8J1JAS to BEACON cti UI pid F0
JAS-1 RA 87/02/28 12:10:02
188 596 714 718 776 880 890 864 003 371
647 002 616 631 625 621 622 623 688 001
793 711 726 719 895 676 926 546 000 000
010 111 100 000 100 000 001 111 001 000

fm DB2OS to G3RUH cti SABM +
fm G3RUH to DB2OS cti I00 pid F0

fm G3RUH to DB2OS cti I01 pid F0

fm G3RUH to DB2OS cti I01 pid F0

fm DB2OS to G3RUH cti SABM
fm G3RUH to DB2OS cti I00 pid F0

fm G3RUH to DB2OS cti I01 pid F0

fm G3RUH to DB2OS cti I02 pid F0
Hi !!!

fm ON6UG to G3RUH cti SABM
fm G3RUH to DB2OS cti I01 pid F0

fm DB2OS to G3RUH cti SABM
fm G3RUH to DB2OS cti UA

fm G3RUH to DB2OS cti DISC
fm G3RUH to DB2OS cti DISC
fm ON1KVH to CQ cti UI pid F0

fm DB2OS to G3RUH cti SABM +
fm DB2OS to G3RUH cti SABM +
fm DB2OS to G3RUH cti SABM +
fm G3RUH to DB2OS cti UA

fm DB2OS to ON1KVH cti SABM +
fm G3RUH to DB2OS cti I00 pid F0
Hi Peter !!! >>

fm DB2OS to G3RUH cti I20 pid F0
hello jim!

fm DB2OS to G3RUH cti UA
fm DB2OS to ON1KVH cti SABM +
fm G3RUH to ON6UG cti SABM

(Let's try it again!)

(Oh, nice! Jim's first Information-Frame, but I missed his UA-Frame!)
(next I-Frame from Jim)

(Next try to get an UA..)

(Now, here we are!!)

(Disconnect-Frame from Jim)

(Oh, another station from Belgium on FUJII!!)

(Again..try to connect G3RUH)

(..and try to connect ON1KVH)

(Here it is..)

fm G3RUH to ON6UG cti SABM
fm ON6UG to G3RUH cti UA
fm DB2OS to ON1KVH cti SABM +
fm G3RUH to ON6UG cti I00 pid F0
Hi Freddy !! >>

fm G3RUH to ON6UG cti I00 pid F0
Hi Freddy !! >>

fm DB2OS to HB9XJ cti SABM +
fm DB2OS to ON1KVH cti SABM +
fm G3RUH to ON6UG cti I00 pid F0
Hi Freddy !! >>

fm DB2OS to HB9XJ cti SABM +
fm DB2OS to ON1KVH cti SABM +
fm G3RUH to ON6UG cti I00 pid F0
Hi Freddy !! >>

fm DB2OS to HB9XJ cti SABM +
fm ON1KVH to DB2OS cti I01 pid F0
godd day first qso

fm G3RUH to DB2OS cti SABM
fm DB2OS to G3RUH cti UA
fm DB2OS to ON1KVH cti I00 pid F0
hello om, name peter and qth near hannover j042vg

fm ON1KVH to DB2OS cti I12 pid F0

fm G3RUH to G3RUH cti I00 pid F0
hi jim >>

fm DB2OS to ON1KVH cti REJ0

(Fuji switched OFF Mode-JD, all QSO's are broken OFF!!)

(next JD-Orbit..)

fm 8J1JAS to BEACON cti UI pid F0
JAS-1 RA 87/02/28 16:00:12
195 599 692 703 758 879 889 864 003 342
647 002 608 621 621 617 618 619 687 001
709 705 712 708 674 677 925 581 000 000
010 111 100 000 100 000 001 111 011 000

fm G3RUH to CQ via FO-12 cti UI pid F0

fm ON6UG to CQ via CH-3 JAS-1 cti UI pid F0

fm DB2OS to CQ DX cti UI pid F0

(etc....QSO's)

(Try to connect HB9XJ and ON1KVH..)

(Jim connects me and my TNC-1 answers.)
(my 1st I-Frame to ON1KVH)

(1st I-Frame from ON1KVH)

(next 5 minute period)

fm 8J1JAS to BEACON cti UI pid F0
JAS-1 RA 87/02/28 16:10:00
204 583 703 707 763 878 891 864 003 351
647 002 608 619 616 612 613 613 688 001
714 708 711 711 863 678 926 583 000 000
010 111 100 000 100 000 001 101 110 000

fm G3RUH to DB2OS cti SABM
fm ON6UG to CQ via VIA CH-3 JAS-1 cti UI pid F0

fm ON6UG to G3RUH cti SABM
fm G3RUH to ON6UG cti DM
fm DB2OS to G3RUH cti I00 pid F0
hello jim!

fm G3RUH to ON6UG cti I10 pid F0
cBack again - what a handful!! >>

fm ON6UG to G3RUH cti I11 pid F0
qsb on jas ???

fm DB2OS to G3RUH cti I01 pid F0
yes, very hectic

fm DB2OS to G3RUH cti I02 pid F0
i'm now on .850

fm G3RUH to ON6UG cti I21 pid F0
Not much - abt 6 db >>

fm ON1KVH to CQ cti UI pid F0

fm ON6UG to G3RUH cti I22 pid F0
ok....here sometimes 10 db

fm ON1KVH to CQ cti UI pid F0
fm G3RUH to DB2OS cti DM
fm G3RUH to ON6UG cti I32 pid F0
Peter is calling too >>

fm G3RUH to ON6UG cti DISC

fm HB9XJ to HB9XJ cti SABM (First HB9-Station!!!)

fm DB2OS to ON1KVH cti SABM +
fm G3RUH to DB2OS cti SABM
fm DB2OS to G3RUH cti UA
fm HB9XJ to HB9XJ cti UA

(With first Path to USA!)

fm KA9LNV to G3RUH cti SABM +
fm W3IWI to G3RUH cti I21 pid F0
gud to wrk u

fm W3IWI to G3RUH cti I22 pid F0
this stuff really does work

fm 8J1JAS to BEACON cti UI pid F0
JAS-1 RA 87/02/28 20:01:10
212 579 680 686 739 877 889 862 003 333
647 002 591 617 615 612 612 613 688 001
714 709 713 709 655 677 925 626 000 000
010 111 100 000 100 000 001 101 110 000

fm KA9LNV to G3RUH cti SABM +
fm G3RUH to KA9LNV cti DM

fm G3RUH to W3IWI cti I32 pid F0
errlic A first? >>

fm DB2OS to W3IWI cti SABM +
fm W3IWI to DB2OS cti DM

fm W3IWI to G3RUH cti I33 pid F0
had a cupple b4. this is first intercontinental qso

fm G3RUH to W3IWI cti I43 pid F0
Yea way out Howie Ga Tom >>

fm G3RUH to W3IWI cti I44 pid F0
Gosh 4 conn r/q>>

fm W3IWI to G3RUH cti I54 pid F0
also see on6

fm KA9LNV to ON6UG cti SABM +
fm ON6UG to KA9LNV cti UA

fm DB2OS to KA9LNV cti SABM +
fm KA9LNV to DB2OS cti DM-
fm W3IWI to G3RUH cti I55 pid F0
also db2os.

fm KA9LNV to ON6UG cti SABM +
fm W3IWI to G3RUH cti I56 pid F0
let me wrk him

fm W3IWI to G3RUH cti I57 pid F0

fm DB2OS to ON1KVH cti SABM +
fm DB2OS to G3RUH cti SABM
fm ON6UG to CQ via VIA CH-3 JAS-1 cti UI pid F0
ok see you later bye

next Mode-JD Orbit

fm W3IWI to DB2OS cti SABM
fm DB2OS to W3IWI cti SABM +
fm DB2OS to W3IWI cti UA
fm DB2OS to W3IWI cti I00 pid F0
hello tom

fm W3IWI to DB2OS cti I10 pid F0
hi we made it!

fm DB2OS to W3IWI cti I01 pid F0
nice to see you

fm W3IWI to DB2OS cti I11 pid F0
great!

fm W3IWI to W3IWI cti I22 pid F0
my 1st qso dl/w

fm DB2OS to W3IWI cti I23 pid F0
great!!!!!!

fm DB2OS to W3IWI cti I24 pid F0
ufb

fm W3IWI to DB2OS cti I22 pid F0
gud to wrk u peter.

fm W3IWI to DB2OS cti I23 pid F0
this is TAPR modem prototype

fm DB2OS to W3IWI cti I32 pid F0
my 1st qso dl/w

fm W3IWI to DB2OS cti I23 pid F0
this is TAPR modem prototype

fm DB2OS to W3IWI cti I45 pid F0
many traffic now..hi

fm DB2OS to W3IWI cti I46 pid F0
fine, im using n'iginal ja with some of your mods

fm DB2OS to W3IWI cti I47 pid F0
how many stations are active in usa on fuji?

(End of transcript)

FO-12 Telemetry Update

The following FO-12 telemetry equations supercede those published in ASR #130, with thanks to W3IWI.

FO-12 Telemetry Data Format

JAS-1 FF YYMM/DD HH:MM:SS
xxx xxx xxx xxx xxx xxx xxx xxx xxx
xxx xxx xxx xxx xxx xxx xxx xxx xxx
xxx xxx xxx xxx xxx xxx xxx xxx xxx
sss sss sss sss sss sss sss sss sss

FF := Frame Identifier
RA: Realtime Telemetry - ASCII
RB: Realtime Telemetry - Binary
SA: Stored Telemetry - ASCII
SB: Stored Telemetry - Binary
M0: Message #0
M1: Message #1
.....
M9: Message #9

YY/MM/DD = Date

HH:MM:SS = Time (UTC)

[Following is valid only for RA and SA frames]

xxx = 000 - 999 Format: 3 digit decimal (Analog Data) 27 samples in row 0 column 0 thru row 2 column 6 (denoted #00 - #26 below)

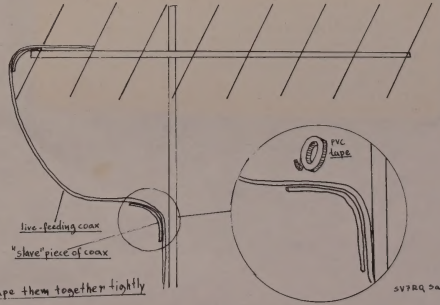
y = 0 - F One byte Hex (System Status Data) 9 samples in row 2 column 7 thru row 2 column 9 (denoted #27a - #29c below)

s = 0 or 1 Binary Status Data 30 samples in row 3 thru row 3 column 9 (denoted #30a - #39c below)

FO-12 Telemetry Calibration Equations		
Ch.	Item	Equation
#00	Total Solar Array Current	1.91 * (N - 4) mA
#01	Battery Charge/Discharge	3.81 * (N - 528) mA
#02	Battery Voltage	N/1000 * 21.0 V
#03	Half-Battery Voltage	N * 0.00937 V
#04	Bus Voltage	N * 0.0192 V
#05	+ 5 V. Regulator Voltage	N * 0.00572 V
#06	- 5 V. Regulator Voltage	N * 0.00572 V
#07	+ 10 V. Regulator Voltage	N * 0.0116 V
#08	JTA Power Output	5.1 * (N - 158) mW
#09	JTD Power Output	5.4 * (N - 116) mW
#10	Calibration Voltage #2	N / 500 V
#11	Offset Voltage #1	N / 500 V
#12	Battery Temperature	0.139 * (689 - N) Deg. C
#13	JTD Temperature	0.139 * (689 - N) Deg. C
#14	Baseplate Temperature #1	0.139 * (689 - N) Deg. C
#15	Baseplate Temperature #2	0.139 * (689 - N) Deg. C
#16	Baseplate Temperature #3	0.139 * (689 - N) Deg. C
#17	Baseplate Temperature #4	0.139 * (689 - N) Deg. C
#18	Temperature Calibration #1	N / 500 V
#19	Offset Voltage #2	N / 500 V
#20	Facet Temperature #1	0.38 * (N - 684) Deg. C
#21	Facet Temperature #2	0.38 * (N - 684) Deg. C
#22	Facet Temperature #3	0.38 * (N - 690) Deg. C
#23	Facet Temperature #4	0.38 * (N - 683) Deg. C
#24	Facet Temperature #5	0.38 * (N - 689) Deg. C
#25	Temperature Calibration #2	N / 500 V
#26	Temperature Calibration #3	N / 500 V
#27	Battery Depth of Discharge	(N - 500)/189 AH

FO-12 System Status Telemetry Bytes		
Ch.	Item	
#28a	Spare (TBD)	
#28b	Spare (TBD)	
#28c	Memory Unit #0 error count	
#29a	Memory Unit #1 error count	
#29b	Memory Unit #2 error count	
#29c	Memory Unit #3 error count	

FO-12 Binary Status Data Points		
Ch.	Item	1 0
#30a	JTA Power	On Off
#30b	JTD Power	On Off
#30c	JTA Beacon	PSK CW
#31a	UVC Status	On Off
#31b	UVC Level	1 2
#31c	Main Relay	On Off
#32a	Engineering Data #1	---
#32b	Battery Status	Tric Full
#32c	Battery Logic	Tric Full
#33a	Engineering Data #2	---
#33b	PCU Status	Bit 1 (LSB)
#33c	PCU Status	Bit 2 (MSB)
#34a	Memory Unit #0	On Off
#34b	Memory Unit #1	On Off
#34c	Memory Unit #2	On Off
#35a	Memory Unit #3	On Off
#35b	Memory Select	Bit 1 (LSB)
#35c	Memory Select	Bit 2 (MSB)
#36a	Engineering Data #3	---
#36b	Engineering Data #4	---
#36c	Computer Power	On Off
#37a	Engineering Data #5	---
#37b	Solar panel #1	Lit Dark
#37c	Solar panel #2	Lit Dark
#38a	Solar panel #3	Lit Dark
#38b	Solar panel #4	Lit Dark
#38c	Solar panel #5	Lit Dark
#39a	Engineering Data #6	---
#39b	CW beacon source	CPU TLM
#39c	Engineering Data #7	---



ASR Tech Tip #5

by Sakis Pouliadis, SV7RQ

Do you want to insure your antennas won't twist around in the first major gust of wind? A few simple steps will help. First, counterbalance the antennas accounting for the weight of the coaxial feed lines as well. Then support the antennas with an oblique strut made of tubular or "L" cross-section plastic material attached to the rear of the antennas. Mount the matching harness to the strut too. The line from the shack then can be anchored to the main support or taped to the mast below the azimuth rotator.

Coaxial cable must not be bent into too tight a radius if damage to it is to be avoided. Normally the manufacturer specifies a bend radius of not less than 10 times the cable diameter or about 4 inches for a typical 50 ohm cable such as RG-213/U (RG-8). To reduce the likelihood of damage, strengthen stress areas on your coaxial lines by merely taping a short length of a similar cable from your junk cable pile to the feed line. (See photos and sketch).

Surrey Requests Listener Reports Amidst 15 Meter Puzzle

The attitude maneuvers with UO-11, using automatic algorithms in the On Board Computer (OBC), have proceeded well — but slowly! The initial spacecraft tumble period was 17.5 minutes. This was reduced to around 44 minutes prior to final stabilization maneuvers currently under way. The action of these de-tumbling algorithms could be observed clearly from the Whole Orbit Data (WOD) surveys taken throughout the last week. The process will continue for an additional several days G3YJO said from Surrey on February 28.

The UO-11 435 MHz downlink will be activated simultaneously with the 145 MHz downlink, each Sunday from 0000-1200 UTC. The 435 MHz downlink will cycle through STATUS (15 seconds), BULLETIN (120 sec.) and DIGITAL STORE/READOUT (DSR) (330 sec). The DSR will transmit at 4800 bps AFSK so it will sound very weak if you try to listen with a normal NBFM receiver. STATUS & BULLETIN data will be at 1200 bps.

UO-11's DIGITAL TALKER will be ON throughout Wednesdays for educational demonstrations. The frequency is 145.825 MHz. Reception reports are appreciated.

Surrey has received letters saying that the 21 MHz UO-9 beacon has not been heard recently despite telemetry indicating that it is ON. The telemetry was checked last week and all appears to be in order. Reception reports would be appreciated. The 15 meter frequency is 21.002 MHz.



Antennas at SV7RQ

The UoSAT team requests all listeners and users send in a post card to indicate reception of UO-9 or UO-11. Your card will help insure better services are provided on a continuing basis. Send you cards to UoSAT Unit, Attention Martin Sweeting, University of Surrey, Guildford, Surrey, GU2 5XH, England.

Short Bursts

- If you are an AMSAT net manager or net control station and wish your AMSAT net listed on AMSAT NA's master net roster, or if you operate or know of a packet radio or dial-up bulletin board that supplies AMSAT News Service bulletins, please let us know as soon as possible. Deadline for inputs is now April 9, 1987. Mail details to AMSAT NA Headquarters, P.O. Box 27, Washington, D.C. 20044.

AMSAT®

The Radio Amateur Satellite Corporation

Post Office Box 27
Washington, DC 20044
(301) 589-6062



Sakis Pouliadis, SV7RQ

Non-Profit
Organization
Second Class
POSTAGE PAID
at
Waterbury, Conn.

LM-1096 KA6M 99.81
MAGNUSKI, HANK
2019 BARBARA DR.
PALO ALTO CA 94303

Amateur Satellite Report (ISSN 0889-6089) is published biweekly for \$16 (inseparable from annual membership dues of \$24) by AMSAT, Post Office Box 27, Washington, DC 20044. Second class postage paid at Silver Spring, MD and additional mailing offices. POSTMASTER: send address changes to *Amateur Satellite Report*, Post Office Box 27, Washington, DC 20044.